MDOT
Michigan Department of Transportation

OFFICE MEMORANDUM

DATE: March 2, 2000

TO: Region Engineers
Resident/Project Engineers/TSC Managers
Region Associate Delivery Engineers
Region Construction Engineers

FROM: C. Thomas Maki
Chief Operations Officer

Gary D. Taylor
Chief Engineer/Deputy Director
Bureau of Highway Technical Services

SUBJECT: Bureau of Highway Instructional Memorandum 2000-06
Special Provision for Critical Path Method Network Schedule

Attached is the Special Provision for Critical Path Method Network Schedule, dated March 1, 2000. This version of the special provision was developed jointly with industry and should be used in place of previous versions that may appear in new projects. Please issue a contract modification to replace the special provision in existing contracts with the one dated March 1, 2000. This change will be approved only if the contractor agrees to no cost change to the contract.

Chief Operations Officer

Chief Engineer/Deputy Director
Bureau of Highway Technical Services

BOHTS:C/T:JDC:kab
Attachment
Subject Index: Special Provisions

cc:
C&T Div. Engineers
C&T Div. Technicians
Real Est., M. Frierson
Design Div., P. Miller
Mtnce Div., C. Roberts
T&S Div., J O'Doherty
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MAPA
MCPA
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MAA
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CRAM
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J. Culp
S. Cook
R. Endres
T. Hynes
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MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CRITICAL PATH METHOD NETWORK SCHEDULE

Description. In addition to the progress schedule provisions contained within this Contract, the low bidder(s) for the work covered by the Contract proposal will be required to submit a Critical Path Method (CPM) Network Schedule to the Engineer for approval. When approved, the CPM Schedule replaces and becomes the Progress Schedule. The CPM schedule shall contain all work under the Contract including but not limited to the activities of subcontractors, vendors, MDOT, suppliers, permitting agencies, utility companies, and other Contract-related activities and the submittal and approval of plans and working drawings. The Contractor shall ensure that the schedule submitted meets specified overall Contract and milestone dates. Milestone dates are dates within the contract that require some specific action by the Contractor. Examples of milestone dates include but are not limited to open to traffic dates.

Preparation of Initial Schedule. Prior to award, the Contractor shall submit a progress schedule on regulation form.

Within 15 calendar days of Contract award, the Contractor shall submit a detailed initial schedule for the Engineer's approval. The schedule shall meet the requirements set forth in the contract.

Within seven (7) calendar days of the Contractor's submittal, the Engineer will review the schedule and provide the Contractor in writing corrections, questions, or comments to resolve before approval of the schedule. The Contractor must make all corrections and resolve all questions and comments within 30 calendar days of Contract award for the Engineer to approve the schedule. If the schedule is not approved within 30 calendar days of Contract award, the Department may withhold all or part of Contract payments until the schedule is approved.

The approval of the schedule by the Engineer in no way attests to the validity of the assumptions, logic constraints, dependency relationships, resource allocations, manpower and equipment, or any other factor that went into the preparation of the CPM network. The Contractor is and shall remain solely responsible for the planning and execution of work in order to meet project milestones or Contract completion dates and to conform to the Contract plans and specifications.

Schedule Requirements. CPM networks shall be submitted using the standard activity-on-node or PERT diagraming method to describe all work activities to be accomplished and their independencies. The schedule shall include all subcontractor, vendor, supplier, and Department Contract-related activities. A sufficient number of activities (tasks) will be required with sufficient detail so that the controlling operation (critical path) may be identified. The work activities shall also be correlated on the

diagram to the proposed sequence of construction operations included in the staging for the project. Notation on each activity shall include a brief work description and activity time duration.

Additional Requirements:

1. Each schedule activity shall be given a unique ID

2. Each schedule activity shall be given a unique description that includes the stage or phase of work and the type or nature of work.

3. Only Start to Start, Finish to Finish and Finish to Start relationships will be allowed. All logic shall show how the given activity is dependent on its preceding activities.

4. Duration (working days): No activity will have duration greater than 20 working days unless approved by the Engineer. Activities that will be allowed to exceed 20 working days include, but are not limited to, working drawing approvals or other activities not under the control of the Contractor. If requested by the Engineer, the Contractor shall explain the reasonableness of activity time durations. Such explanation may include, but not be limited to, estimated activity manpower, unit quantities, production rates, and equipment to be mobilized.

5. Procurement and Submittals: Separate procurement into at least two activities, fabrication and delivery. When the procurement also requires a submittal to and approval by the Department, such as shop drawings, insure these separate activities are shown in the schedule logic. Ensure all work activities that require a submittal are preceded by submittal and approval activities.

6. Constraints: Use contractual constraints in the schedule logic. Other constraints may be allowed when identified by the Contractor and approved by the Engineer.

7. Float: Float is defined within the Special Provision for Progress Schedule.

8. The activities are to be described so that the work is readily identifiable and the progress on each activities can be readily measured. For each activity, the Contractor shall identify the work force involved by trade, subcontractor, equipment, work location and duration of activities in work days.

9. The Contractor shall also provide the following information: workdays per week, holidays, number of shifts per day and number of hours per shift.

10. Activity codes: Activities shall be identified by codes to reflect the following information related to an activity or other method as approved by the Engineer that is compatible with the computerized sort requirements below:

    Stage/Phase

    Area/Location

11. Computer capability: The CPM schedule must be processed through a computer and be compatible with the format section contained within this special provision. It is the Contractor's responsibility to ascertain the software compatibility with the Resident Engineer.

Initial Schedule Submittal Requirements. Provide one reproducible original and three copies of each of the following to the Engineer for approval for both the initially submitted schedule and all updates:

1. Submit a computer generated sequential activity-on-node diagram. Ensure that the diagram network is legible and easily understandable.

2. Computerized sorts by:

    Activity ID
    Predecessor/successor sort
    Total float
    Early start
    Resource responsibility
    Area/Early start sort

3. 60-day look ahead bar charts by early start

Schedule Updates. The Contractor shall update the schedule monthly to show current progress. The update shall be submitted to the Engineer regardless of any unresolved requests for extension of time during this period. The update will include:

1. Dates of activities' actual start and completion

2. The percentage of each work activity remaining for activities started but not complete as of the update date.

3. Narrative report which includes a listing of monthly progress, the activities that define the critical path, and any changes to the path of critical activities from previous update, sources of delay, any potential problems, requested logic changes, and work planned for the next month.

4. If requested by the Engineer, the update submittal may include:

   Predecessor/Successor sort
   Total float sort
   Responsibility/Early start sort
   Area/Early start sort

5. Fragnet or logic diagram for all requested logic changes, including but not limited to, any of the events as addressed in the Special Provision for Progress Schedule.

6. Updated logic diagram and time scale/logic diagram as required by the Engineer.

7. Regular job site progress meetings with the Engineer will be required to verify CPM accuracy. Update as required to reflect actual work modifications and progress and to document approved Contract modifications.

The Department may withhold all or part of the Contract payments if the schedule update is not submitted within 14 days of the date due.

Schedule Revisions. The Contractor will revise the schedule for the following: delay in completion of the project or contractual milestones; actual prosecution of the work which is, as determined by the Engineer, significantly different than that represented on the schedule; or the addition, deletion, or revision of activities required by Contract modification. Time extensions will only be granted for Department-caused delays that affect specifically approved milestone dates, open to traffic date, or overall Contract completion date, except as otherwise expressly authorized in the contract. Include support documentation.

Schedule Revisions to Utility Work. The Engineer shall be provided with ten (10) days notice, with a copy of the notice to the utility company, when revisions in the schedule of work affect operations of a utility unless previous arrangements have been made with the utility company involved or there are other contract requirements that supercede this requirement.

Format. In addition to the above requirements, all job network schedules shall be submitted on a 3.5 inch floppy disk in accordance with one of the following formats. In lieu of the format requirements, the Contractor may submit for the Department's use, during the life of the project, one complete copy of the scheduling software used for this Contract. Submittal shall be in accordance with the copyright requirements for the applicable software.

1. **Standard Electronic Media Format** is a standard ASCII text file containing the data elements below, in the order specified. This file can be created using any text editor or word processing application (i.e., MS-Word, WordPerfect, Notepad, or Write) but must be saved as an ASCII file.

   The **first line** will provide a descriptive header describing the submittal and containing:

   Control Section
   Job Number
   Contractor name
   Data as-of-date
   Report date

   The next line will be **blank**, followed by multiple data lines.

   Each **data line** will contain one record pertaining to one task of the job. Separate data fields by a comma. Fields within each task line are as follows:

   (Note that the term "task" is synonymous with "activity." Leave fields that are not required blank.)

   A. Task number (Job number followed by a hyphen followed by this task's unique four-digit task number. This is the Preceding Event Activity Code).
   B. Description of Task, Milestone or Hammock, blank if this record is a constraint
   C. Calendar (see attached list)
   D. Duration of task, blank for constraints
   E. Task number of the next task (succeeding event) - leave blank if this record is not a constraint or hammock
   F. Type of constraint (FS, SS, SF, HAM) - leave blank if this record is not a constraint or hammock. A hammock is a special type of constraint that groups several tasks together. The hammock starts with the first task in the group and finishes with the finish of the last task. (F = Finish, S = Start)
   G. Delay, if required
   H. Original "baseline" start date
   I. Original "baseline" finish date
   J. Current (forecast) start date (early start)
   K. Current (forecast) finish date (early finish)
   L. Estimated completion date (if different from early start + current duration)
   M. Late start date
   N. Late finish date
   O. Actual start date
   P. Actual finish date

Example - each line contains the following:

Task number (preceding event), description, calendar, duration, next task number (succeeding event), constraint type, delay, baseline start, baseline finish, estimated completion date, late start, late finish, actual start, actual finish, total float.

2. **Export Files:** If the Contractor chooses to use packages with export capabilities, they shall include all items listed in the Standard Media Format in a text or ASCII-type file.

Michigan Department of Transportation (MDOT) Calendars: The Contractor's calendar shall be based on a 4-, 5-, or 6-day work week in accordance with the attached MDOT calendars unless otherwise superseded by the Contract requirements.

Measurement and Payment. The Contractor's cost to provide this information and software to the Michigan Department of Transportation will not be paid for separately, but shall be included in costs for other pay items.

MDOT Calendars: The following are the MDOT 4-, 5-, and 6-day calendars:

Calendar	Description	Start	Finish
1	Std - Apr 16 - Nov 15 - 4 day	Apr 16	Nov 15
2	LP - Bit Stab - 4 day	May 15	Oct 15
3	UP - Bit Stab - 4 day	Jun 01	Oct 01
4	LP S of M-46 - Bit Pave - 4 day	May 05	Nov 15
5	LP N of M-46 - Bit Pave - 4 day	May 15	Nov 01
6	UP - Bit Pave - 4 day	June 01	Oct 15
7	LP - Bit Seal Coat - 4 day	Jun 01	Sep 15
8	UP - Bit Seal Coat - 4 day	Jun 15	Sep 01
9	Tree Planting - Deciduous - 4 day	Mar 01 Oct 01	May 15 Nov 15
10	Tree Planting - Evergreen - 4 day	Mar 01	Jun 01
11	South LP - Restoration - 4 day	May 01	Oct 10
12	North LP - Restoration - 4 day	May 01	Oct 01
13	UP - Restoration - 4 day	May 01	Sep 20
14	Full Year - Winter Work - 4 day	Jan 01	Dec 31
21	Std - Apr 16 - Nov 15 - 5 day	Apr 16	Nov 15
22	LP - Bit Stab - 5 day	May 15	Oct 15
23	Up - Bit Stab - 5 day	Jun 01	Oct 01
24	LP S of M-46 - Bit Pave - 5 day	May 05	Nov 15
25	LP N of M-46 - Bit Pave - 5 day	May 15	Nov 01
26	UP - Bit Pave - 5 day	Jun 01	Oct 15
27	LP - Bit Seal Coat - 5 day	Jun 01	Sep 15
28	UP - Bit Seal Coat - 5 day	Jun 15	Sep 01
29	Tree Planting - Deciduous - 5 day	Mar 01 Oct 01	May 01 Nov 15
30	Tree Planting - Evergreen - 5 day	Mar 01	Jun 01
31	South LP - Restoration - 5 day	May 01	Oct 10
32	North LP - Restoration - 5 day	May 01	Oct 01
33	UP - Restoration - 5 day	May 01	Sep 20
34	Full Year - Winter Work - 5 day	Jan 01	Dec 31

35	Full Year - Expedited - 6 day	Jan 01	Dec 31